

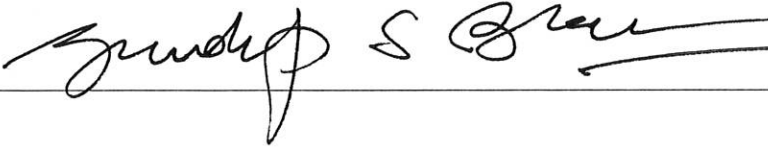


Public Service Commission of Wisconsin Office
of Energy Innovation
Critical Infrastructure Microgrid and
Community Resilience Center Pilot Grant
Program



Public Service Commission of Wisconsin
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ATTACHMENT A - COVER SHEET

SECTION I - Provide information summarizing the project proposal.				
Project Title:		City of Middleton Business Park Microgrid & CRC		
PSC Grant Request (\$):		Applicant Cost Share (\$):		Project Total (\$):
\$100,000		\$9,232		\$109,232
Choose one Eligible Activity				
<input type="checkbox"/> Critical Infrastructure Microgrid Feasibility Study Level 1 and 2		<input type="checkbox"/> Critical Infrastructure Microgrid Feasibility Study Level 3		<input checked="" type="checkbox"/> Community Resilience Center Feasibility Study
SECTION II - Provide information for your organization, signatory, and primary contact for the project.				
Applicant Type:	<input checked="" type="checkbox"/> City	<input type="checkbox"/> Village	<input type="checkbox"/> Town	<input type="checkbox"/> County
<input type="checkbox"/> Tribal Nation		<input type="checkbox"/> Wisconsin Technical College System		
<input type="checkbox"/> University of Wisconsin System		<input type="checkbox"/> K-12 School District	<input type="checkbox"/> 501(c)(3) nonprofit	
<input type="checkbox"/> Municipal Utility (water, wastewater, electric, natural gas)			<input type="checkbox"/> Hospital (public or nonprofit)	
Name (on W-9):		City of Middleton, WI		
Address (on W-9):		7426 Hubbard Avenue, Middleton, WI 53562		
County or Counties Served by Project:		Dane County		
DUNS Number or CAGE Code:		054266010		
NAICS Code:		921190		
Authorized Representative/Signatory (Person authorized to submit applications and sign contracts)			Primary Contact (if different from Authorized Representative)	
Name: Gurdip Brar			Name: Kelly Hilyard	
Title: Mayor			Title: Sustainability Coordinator	
Phone: (608) 821-8350			Phone: (608) 821-8362	
E-mail: mayor@cityofmiddleton.us			E-mail: khilyard@cityofmiddleton.us	
Signature of the Authorized Representative				

City of Middleton

Business Park Microgrid & CRC

Summary of Project Budget				
Line	Description	PSC Grant Request	Applicant Cost Share	Total Project Cost
1	Personnel		\$9,232	\$9,232
2	Fringe			\$0
5	Travel			\$0
6	Contractual	\$100,000		\$100,000
7	Other			\$0
8	Indirect			\$0
Totals		\$100,000	\$9,232	\$109,232
% of Total		92%	8%	

Applicant Comments: N/A

3.3 Application Narrative

Project Description

City Background

The City of Middleton proposes to use the Wisconsin Public Service Commission Office of Energy Innovation Critical Infrastructure Microgrid and Community Resilience Center Pilot Grant Program to fund a feasibility study for the development of the Business Park (BP) Microgrid and emergency Community Resilience Center in the City's critical industrial area. The BP Microgrid will follow the model of a town center or community microgrid, which is developed in an area of a community that delivers power to a physically non-contiguous group of critical facilities, often involving multiple distributed energy resources and crossing multiple public right of ways (RoW).¹

The project concept to be investigated by this feasibility study will use primarily renewable energy sources, including solar PV and battery storage, to create an emergency microgrid to power critical economic, industrial, and public safety infrastructure in the event of a catastrophic power outage, similar to the emergency Middleton experienced during the flooding of 2018. This application will fall under Activity 3 according to the grant guidelines as a Level 3 Microgrid and Community Resilience Center (CRC) and therefore is requesting \$100,000 in grant funding.

The purpose of the BP Microgrid is to provide backup power to a selected area of the City of Middleton during extended outages to Madison Gas & Electric (MGE) feeder Pheasant Branch 1321. This outage could be the result of distribution system events, transmission system events or wide area blackouts. This emergency backup power will allow the industrial area and buildings within it to continue to function as critical infrastructure, including businesses necessary for logistics, public health, and storage, as well as serving as a CRC for emergency shelter and other resources.

The proposed feasibility study will include analysis of historical energy use and cost in the study area, project identification, sizing and scaling, physical site/facilities due diligence and communication with the diverse ownership of potential solar hosts, a comprehensive baseline, a climate change and natural hazard vulnerability study, projected financial and environmental benefits for the project, a phasing strategy for growing the project in the future, and financial analysis to determine funding sources for implementation.

The project's overarching goals are to:

- **Increase resiliency community-wide** by keeping power on for necessary emergency services.
- **Save money** through peak shaving and demand reduction.
- Create opportunity to **run specific parts of the industrial area from the BP microgrid.**
- **Establish a Crisis Plan to utilize power generation and storage** within the microgrid to maintain essential services for the greater part of western Dane County, including emergency utilization of the Middleton Airport, health services, pharmacy services, mental health services, warehousing, communications centers, distribution centers, and several large recreation centers than can be converted into Community Resilience Centers, starting with the KEVA Sports Center.
- Provide **grid services** such as kW savings, frequency modulation, and potential network stabilization.
- **Train city staff** on project management, bid preparation, and operations to make replicable.

¹ https://dev.microgrids.io/wp-content/uploads/Local_Govt_Resilient_Microgrids_Report.pdf

- **Create communications deliverables to share knowledge and data performance** with our networks such as Green Tier Legacy Communities, LEED for Cities national certification cohort, Urban Sustainability Directors Network, local municipal collaborative workgroups and the City's website.

This project represents a continuation of the City of Middleton's commitment to sustainability and reaching its renewable energy goals. Middleton received an Energy Innovation Grant in 2018 for Comprehensive Energy Planning. The City partnered with six other Dane County municipalities to form a Seven City Comprehensive Energy Planning collaborative. Community specific energy plans were prepared by Slipstream, our consultant for that grant, as well as an overall Energy Plan Report. The Middleton Police Department has an existing 100 kW solar PV installation on its rooftop that produces 25% of the building's energy. And the City was recently awarded the PSC Energy Innovation Grant for a solar and battery storage system at the Police Department. The city also installed, with partner MGE, the first community-solar installation in the area, a 5 MW array on 21 acres just north of the airport. The City is committed to obtaining a 100% renewable energy goal for the city.

The preliminary concept for the BP Microgrid would be to include the 5 MW array into the microgrid, if possible, along with an additional 35 acres of rooftop space available for distributed solar arrays throughout the microgrid. This will allow for greater redundancy, shifting of power generation to critical needs during a crisis, development of a community-based resilience concept, as well as allowing each individual business to participate in energy savings throughout the program.

Project Study Area

In August 2018, almost a foot of rain fell on Middleton in 24 hours, causing massive flooding – including of the proposed project area industrial district. This flooding led to a Federal Disaster Declaration and many businesses were without power for more than 24 hours and experienced extensive flooding and cessation of business. This event revealed that the city's emergency infrastructure was based on pre-climate change calculations, and that an entirely new level of preparedness would be required going forward. Since that time, the City of Middleton has taken many significant steps to become a more resilient community, particularly around its energy systems and emergency preparedness.

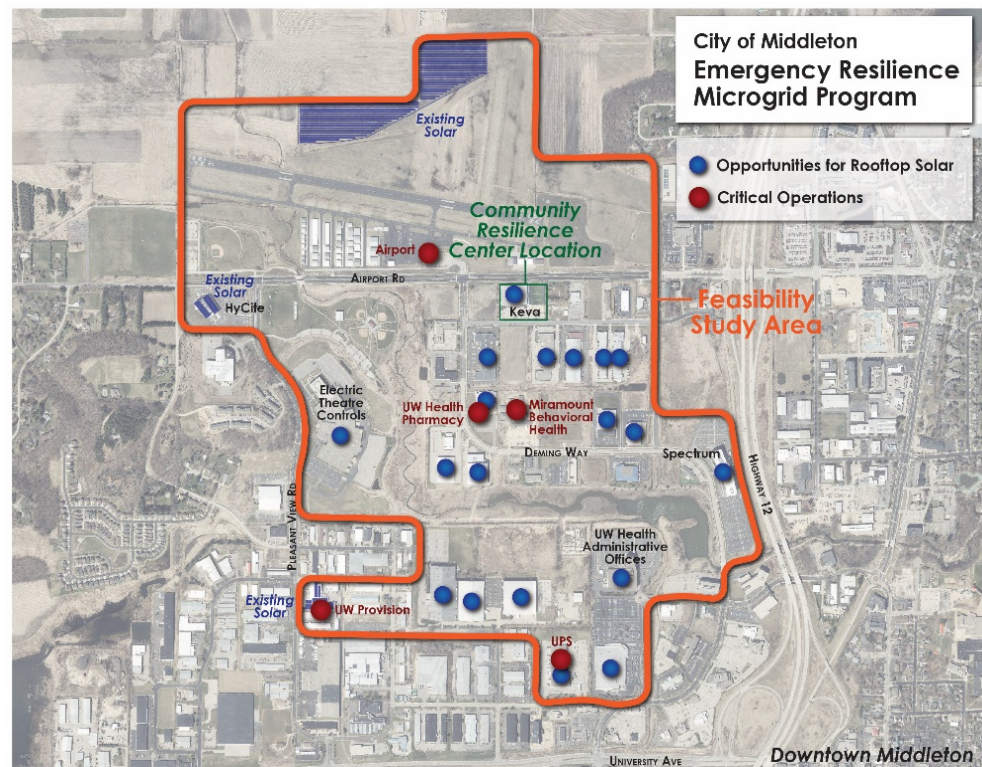


Figure 1: Proposed Business Park Microgrid & CRC Study Area, Middleton, WI

Middleton has a well-defined light industrial district with a number of large warehouses and offices. These businesses, whose large rooftops would host the proposed BP Microgrid, include the Middleton Municipal Airport, Costco, UW Provisions (meat distribution), Frank Beverage (distributor), KEVA Sports Center, Hitters SportsPlex, UW Hospitals Pharmacy, UPS, and the new Miramont Behavioral Health facility. These businesses and organizations comprise a significant percentage of the essential service infrastructure for western Dane County, as well as providing extensive space for emergency lodging. The BP Microgrid project will also help address some of the business community's concerns caused when the City's green infrastructure was unable to mitigate the 500+ year flood of 2018 which lead to substantial flood damage, power outage, and loss of productivity. This project will create a new approach to resilience that serves the needs of both the business park and the community.

Project Description

The project proposed for this feasibility study includes a community microgrid that will be planned to potentially serve the more than 60 businesses in the Middleton light-industrial area located on the city's northwest side. Specific sizing, business involvement, and scaling will be determined as part of the study. The emergency BP Microgrid will help establish the area and a number of businesses within the industrial district, in particular the KEVA Sports Center, as a CRC for emergency shelter and resources in the event of power outages or other disasters.

The feasibility study will also include an evaluation of existing and new solar energy capacity (approximately 35 acres of existing rooftops have been identified as potential solar installations) to feed into the microgrid as well as an evaluation of potential energy storage methods – including using electric car batteries as overnight storage (particularly at locations like UPS, Frank Beverage, UW Provisions). The study will include a phasing plan to determine how the project could potentially grow and expand in the future to incorporate additional businesses as well as explore integrating new green infrastructure to mitigate future flood events. While the project proposes to use technology that is readily available and well known to the community (as described in Section 3.4.1.), its size and scope will require extensive planning.

By building a TC-style microgrid powered primarily through renewable resources (possibly including the existing airport 5MW solar array and new solar installations on the extensive rooftops and open spaces of our industrial customers), Middleton will be able to prepare for ongoing energy needs during a general power shutdown, emergency housing for residents, and securing the food distribution infrastructure for the area. The airport will be used to provide any necessary relief supplies, including ensuring the continuity of organ transplant transportation to Madison hospitals.

The KEVA Sports Center is youth sports and indoor recreational facility that has been located in Dane County for more than 20 years. The large facility is over 130,000 square feet and was identified as a strong possibility for a CRC which could provide emergency services to the City of Middleton and its residents. Many of the building's features make it a contender for a CRC. Its expansive interior space has the potential to shelter significant numbers of people or serve as a critical personnel area in an emergency. The building has significant infrastructure for heating and cooling in times of dramatic weather; it is highly accessible, located just off of the Beltline; its core business function includes food and beverage service and therefore could accommodate emergency food and cold storage needs. The building's large footprint also includes a large rooftop to serve as a host site for rooftop solar. The KEVA Sports Center's large parking area also presents opportunities for emergency staging, tents, drive through

resource delivery and other critical outdoor services. The KEVA Sports Center is a committed Middleton corporate resident and has provided a letter of support for the City's application.

This area also contains a large drainage confluence that forms a large wetland/settlement pond that eventually flows into Pheasant Branch conservancy and Lake Mendota. This public land provides opportunities in future project phases to create a combination of flood mitigation efforts, nutrient reduction practices, and recreational opportunities while building out the microgrid and energy storage platform.

In addition to energy management, associated cost savings, and resiliency, the City embraces its demonstrated role as an early adopter of new and innovative sustainable technology, utility partnerships, energy planning, and city-wide climate change mitigation policies. This project would give us an opportunity to learn best practices from start to finish about cutting edge community microgrid design and development in order to replicate future projects that serve the public, and also to share out what we have learned with other Wisconsin communities our size. Education will be a key aspect of this proposal both internally between departments within the city, and externally with local, state, and national cohorts with which we are currently engaged.

Populations and Lifelines Served

Completion of the feasibility study will further identify populations and lifelines served by the TC microgrid and will allow for further engagement with project stakeholders. However, at this time, the project concept will serve the following populations and lifelines:

- **Middleton Residents** The businesses and facilities involved in the BP Microgrid project represent critical infrastructure to the City and its residents and their continued function in the event of a power outage or emergency will allow the critical economic, logistical, public health lifelines included in the project to continue functioning and serving residents. The benefits of the BP Microgrid will be experienced community-wide by all residents. Residents of particular locations within the City might also benefit from emergency shelter and resiliency resources within the CRC if an adverse event impacts their homes.
- **Industrial Businesses** Businesses within the study area provide critical lifeline services to the City of Middleton and greater Dane County region. These businesses are in numerous fields and industries, from retail to manufacturing, pharmaceuticals to food supply chain, and medical services to entertainment. Not only does the continuation of their business in times of emergency and during power outages enable life in the area to continue to function, but their facilities, following examination in the feasibility study, could be used as emergency resource locations for the City of Middleton's essential services and by residents.

Reference Materials List

1. Study Area Map
2. Business Park Solar Sites List
3. City of Middleton Resolution
4. Letters of Support
 - 4.1. MG&E
 - 4.2. KEVA Sports Center

- 4.3. Additional Business Park Businesses
- 5. [Sustainable City Plan](#) (Linked in Document)
- 6. [2021 Comprehensive Plan Update](#) (Linked in Document)

3.4 Merit Review Criteria

3.4.1 Identification of Critical Infrastructure

This section is N/A as we are applying under Activity 3.

3.4.2 Key Partners and Stakeholders

The City of Middleton has a history of working with partners to explore different ownership models, including with MGE on the Police Department solar project. Given the size, scope and diversity of sites for the intended rooftop solar installations, MGE intends to own the future microgrid components that are “in-front” of the customer meters and is committed to working as a partner with the City on the design, installation, and operation of the BP Microgrid. The City has worked closely with MGE in the initial scoping of the concept project and has received a letter of support and commitment from MGE.

The City of Middleton will serve as the administrator and organizer of the project. Kelly Hilyard is the Sustainability Coordinator and she will work with the Planning, Police, Fire, Public Works, and Building Inspection Departments as a project manager to coordinate work with HGA Architects and Engineers and MGE for completion of the feasibility study.

HGA Architects and Engineers will serve as engineering partners in completion of the feasibility study. HGA has a strong history of designing and implementing complex solar and storage projects and has worked with the City on numerous occasions to develop its existing solar footprint. HGA will be a partner with the City of Middleton on this feasibility study and determine the size and conceptual design of the system, size the battery, determine needs for creation of the CRC at participating businesses, and identifying phasing opportunities for future installations. HGA will bring on additional resources as needed to support the technical nature of this project such as a consultant specializing in distribution engineering with an existing relationship with MGE as well as a microgrid techno-economic modeler.

As detailed in the project description, this project has the capacity to touch many different populations and stakeholder groups. Additional project stakeholders for this application include:

Industrial Area Businesses Over 60 businesses in the study area could potentially host rooftop solar (~ 35 acres) to implement the BP Microgrid and serve as an emergency resilience center location for the City in the event of a disaster. Businesses including the KEVA Sports Center have the ability to power emergency equipment, cellphones, computers, and communication equipment, temporarily house residents, and provide refrigeration for emergency food and supplies. UW Provisions could also utilize existing refrigeration and freezers for necessary emergency supplies. Connecting them to the BP Microgrid will allow them to maintain power in the event of an outage. Other businesses in the microgrid will be able to maintain power and continue their essential businesses services in the event of an emergency like UPS and the UW Hospital Pharmacies. Letters of support from a number of these businesses are included in this application.

Middleton Municipal Airport As part of the BP Microgrid, the airport will be able to maintain its role as critical infrastructure, continuing to operate in the event of a power outage or natural disaster. The airport serves a particularly crucial role not only for Middleton but for Dane County as a Medflight location, enabling essential medical services to continue in emergency situations.

Middleton Fire Department and Emergency Services The project team will engage with Middleton’s first response emergency services, including the Fire Department, to establish the CRC and ensure it can serve an important public safety role in the event of an emergency.

3.4.3. Project Resilience Objectives and Metrics

Middleton is committed to sustainability and energy innovation and has taken numerous steps in project implementation, staffing, and planning to advance its sustainability goals. Middleton formed a Sustainability Committee to establish a sustainability lens for all municipal decisions in 2010. That same year the City joined the Wisconsin Green Tier Legacy Communities Charter and adopted its first Sustainable City Plan. [The Sustainable City Plan](#) lists a variety of indicators, targets, actions, and performance measures pertaining to energy. The original plan called for 25% of the City's electric power and transportation fuels to be generated from renewable resources by 2025 (a goal established through the Energy Independent Communities program). The City has already met this goal. In 2016, the City worked with MGE to install a 500 kW “shared solar” array at the Middleton Operations Center and a 100 kW solar array at the Middleton Police Station. The police station solar powers 25% of the building’s energy needs. In 2018, Middleton passed a resolution setting a 100% renewable energy goal community-wide by 2050 and won a grant from the Office of Energy Innovation for comprehensive energy planning. At the same time, Middleton partnered with MGE to purchase ½ megawatt (MW) of 5 MW available in a second “shared solar” array at Middleton Municipal Airport. The City is now implementing the energy plan produced from our 2018 OEI energy planning grant, and we hope to implement resiliency along with energy savings.

The City of Middleton’s [2021 Comprehensive Plan Update](#) includes a number of sustainability and energy savings goals and initiatives that align with the BP Microgrid project. A key strategy of the Plan is to “Adapt to climate change effects, community emergencies, economic downturns, and unforeseen events that challenge our City through robust resiliency planning that will reduce risks, mitigate ecological degradation, and provide equitable disaster response for all citizens, businesses, and industry.” (p. 94) The feasibility funded by this grant will be a direct step in advancing this strategy and will provide the City with essential planning to be more resilient in its response to and anticipation of the effects of climate change. The vision for this project specifically addresses one of the central actions in the Plan’s Green City Chapter, which is “Middleton will partner with MG&E to pilot and plan for future microgrid networks that can connect to one another to reduce risk, increase resiliency, and optimize energy distribution.” (p. 98)

The BP Microgrid will expand this commitment to energy innovation and savings and will add to the goals the City hopes to meet in the future.

Specific resilience and objectives for the TC microgrid include:

1. Prevent sustained power outages within the study area and provide emergency power for the duration of an outage.
 - a. Metric: Track utility data and power usage to measure outages and events that trigger the emergency microgrid
2. Establish CRC facilities within the study area to adequately serve the City’s needs in an emergency
 - a. Metric: Establish at least one location for CRC and identify and communicate the emergency resiliency facilities within the study area to residents, businesses, and emergency personnel
 - b. Metric: Establish a communication protocol for deploying the CRC in an emergency

- c. Metric: Track all usage of the CRC as well as populations (total numbers, duration of services, etc.) served during emergency events
- 3. As the City's fleet of electric vehicles (EV) expands, establish the CRC as an EV charging location, particularly in emergencies.
 - a. Metric: As part of the feasibility study, determine an appropriate number of EV charging stations and construct them within the study area

3.4.4 Evaluation of Site-Specific Information

Middleton's industrial district and this project's study area is located on the northwest side of the city north of University Avenue and west of US12 (the Beltline). The area extends north to include the Middleton Municipal Airport and the western edge of the business park. The area includes over 60 businesses including Costco, KEVA Sports Center, UPS, UW Hospital Pharmacy Services, and PPD, Inc. A full list of businesses is included in the reference materials. The area encompasses 650 acres and 35 acres of rooftops. Due to the large potential scale of this project, the feasibility study seeks to determine the appropriate size and scale of the project, determining the optimal size to meet the demand needs as a CRC and the economic feasibility to accomplish implementation. The study will also include consideration of project phasing, potentially starting the project with 4 hours of battery storage with associated solar and expanding into other areas of the business park, adding more businesses into the BP Microgrid.

Site Opportunities and Challenges

The study area was chosen for a number of the advantages it presents and its ability to serve as an emergency energy backup to critical businesses, efficiently creating a microgrid capitalizing on the availability of rooftops and creating of a CRC to serve the City and residents in an emergency. Colocation of the generation sites, particularly the rooftop solar arrays on industrial businesses, provides an opportunity to build efficiency across generation sites. These businesses represent critical economic, logistic, and public health infrastructure. This site allows the BP Microgrid to serve businesses close to transportation infrastructure like the airport and US12, which are key logistical resources. The area's large business facilities also provide expansive rooftop space for solar generation and parking areas for the potential installment of EV charging locations. Increasing EV charging stations in an employment center like the industrial district will not only encourage employees to have EVs but will allow them to charge their vehicles during the workday.

The City owns a significant portion of the land through and around this study area, including additional land around the airport, along the drainage ditch, two large public parks, and the drainage wetlands running through the industrial park. These areas will be explored as potential joint-use siting for both solar arrays and water quality/water quantity developments.

While the site is well suited to the BP Microgrid project, there are some constraints. The diverse private ownership of the potential host sites could pose challenges to getting use agreements. However, the project partners have strong relationships with the industrial district's businesses, many of whom have provided letters of support, and the project team intends to engage these stakeholders to participate in the project. These businesses were also impacted heavily by the 2018 flooding and are working on individual resilience planning and overall hardening of the infrastructure of the area.

Existing Generation Assets

The City of Middleton owns a number of existing solar and self-generating assets in the community. These include:

- Solar and Battery Storage at Middleton Police Department
- Solar Array at Lakeview Park (shelter rooftop)
- Solar Array at Middleton EMS Station
- Solar Array at Middleton Recycling Center

Self-generation assets owned by other customers and MGE located within the study area include:

- MGE: 5MW Solar Array located at the Middleton Municipal Airport/Morey Field
- Hy Cite: 92kW Solar Array
- Spectrum Brands: 1.8MW Diesel Generator
- PPD: 900kW Diesel Generator

As the specific BP Microgrid is designed and scoped during the feasibility process, permitting requirements will be determined. At this time, the project team does not expect that permitting requirements will have a negative impact on the feasibility study or on project implementation.

3.4.5. Technologies Under Consideration

As previously mentioned, the City of Middleton is home to numerous solar projects and is a leader in the region and in the state in adoption of energy savings and sustainability initiatives.

The feasibility study will ultimately determine the appropriate technologies for the BP microgrid. At this time, the following technologies are under consideration. Each technology is readily available and already being used within the City.

- | | |
|--|--|
| • Rooftop Solar PV | • Battery Storage |
| • Ground Mount Solar PV | • Project Controls |
| • Utility Solar | • Diesel Backup Generator(s) – to keep critical loads operational in long-term emergencies that extend beyond the renewable system’s capacity. |
| ○ Potentially the 5MW array at Middleton Municipal Airport. Additional study will determine if it can be included. | |

While this proposal may seem to be a “far fetched” idea, there are examples of TC microgrids being implemented in the United States. Redwood Coast Airport Microgrid² in Humboldt County, CA is one example of a project that is currently underway.

² <http://schatzcenter.org/acv/>

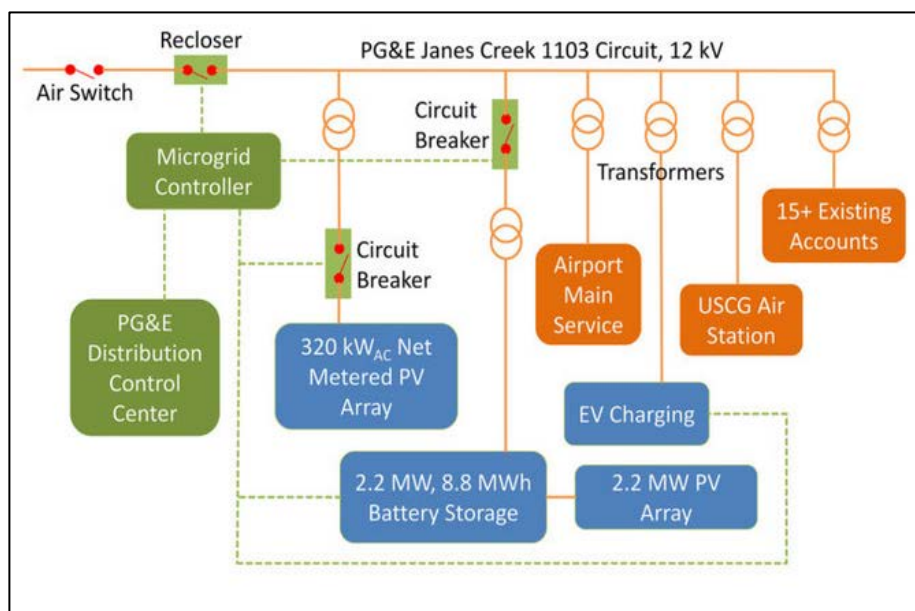


Figure 2: Redwood Coast Airport Microgrid (Source: <http://schatzcenter.org/acv/>)

3.4.6. Cost Match

The City of Middleton and its partners are committed to the completion of this feasibility study and the ultimate implementation of the BP Microgrid. This project is considered an implementation of its Sustainability Plan and Comprehensive Plan and is a continued effort to reach its energy independence goals and expand its resiliency. This grant is essential to the completion of the feasibility study as it is unlikely to be accomplished without grant funds.

This project is not likely to move forward without funding for the following reasons:

- The City budget is constrained by property tax levy limits and generally flat state aids.
- It is difficult to fund new capital project studies that need to compete with limited resources to maintain existing infrastructure and assets.
- The COVID-19 pandemic has put additional strain on City finances. This includes both reductions in revenue in areas such as interest income, program fees, and room taxes. At the same time the City has higher operating costs to safely maintain essential services.

To further demonstrate its commitment to the BP Microgrid project and completion of the feasibility study, all City personnel hours in this proposal are designated Match funds for this grant. These Match funds will cover training time and project management.

Name	Position	Fringe	Direct Comp.	Hours	Total	Match Contribution
Kelly Hilyard	Sustainability Coordinator	\$2.20	\$32.55	120	\$4,170	\$4,170
Abby Attoun	Director of Planning	\$11.82	\$47.12	40	\$2,358	\$2,358
Shawn Ulsrud	Engineering Technician III	\$11.00	\$34.94	20	\$919	\$919
Shawn Stausky	City Engineer	\$12.63	\$59.14	20	\$1,435	\$1,435
Bill Burns	Finance Director	\$12.06	\$58.01	5	\$350	\$350
Total					\$9,232	\$9,232

3.4.7. Data Collection Plan

Due to the large number of facilities located in the site area, a thoughtful data collection plan is critical to the development of the microgrid equipment selection and sizing. The project team will work with facility owners to have MGE release historical 15-minute interval electricity data for the facilities' 2020 electrical use. BP Microgrid aggregate 15-min consumption data will also be used.

15-minute metering data from the MGE feeder Pheasant Branch 1321 will also be used to inform the project system sizing and design. Preliminary project analysis indicates that there is approximately 6MW of maximum on-peak load for the project area.

In situations where utility data is not released by the customer, the consultants will simulate 15-min interval data for those facilities based on similar building types and usage. Gas data will not be evaluated as part of the microgrid study. A site survey of all the buildings will be completed to identify existing on-site generation and main switchgear configuration. Generator information will be gathered to determine if the existing generators may be capable of operating in parallel with other generators on the system.

HGA will work with MGE to map the existing electrical infrastructure in the site area and identify additional equipment that will be required for the safe and reliable operation of the microgrid, including telemetry and other control and monitoring equipment.

Based on the flexible data collection plan described above, the study will be able to be completed within the grant period (June 30, 2022).

3.4.8. System Sizing Analysis

As part of the feasibility study, the consultant will utilize a combination of spreadsheet tools and energy modeling software such as Homer Energy, NREL reOPT or other custom software, to develop operational and economic modeling for the project.

Based on the forecasted building loads, the consultant will determine the appropriate system sizing for the microgrid components to meet the resiliency requirements identified in section 3.4.3. The BP Microgrid will consist of a combination of behind the meter resources and in-front of the meter resources. Existing customer sited generation will be evaluated to determine how it may interface with the microgrid. The existing 5MW MGE owned solar installation will also be evaluated to determine how it can be integrated into the BP Microgrid.

Project Assumptions:

- Renewable resources and storage resources located within the Middleton Microgrid (primarily rooftop solar) will be integrated into the microgrid. Individual resource controllers will be reconfigured or replaced to work in synergy with the microgrid controllers.
- Distribution protection systems within the microgrid can be reconfigured such that they do not reduce the reliability to customers when the microgrid is not operational.
- Separating the MGE distribution system into a microgrid is not a simple task. Part of the feasibility is to understand whether this can be completed effectively. Additionally, given that this is probably the first of its kind in Wisconsin, we will need to work with the PSCW to understand the regulatory complexities.

- Due to the number of facilities served by the microgrid and potential limitations on the emergency power generation, it is likely that each of the buildings will have their grid connection remotely controlled such that when the system is in microgrid mode, buildings can be energized to match the available power available. The critical buildings would be prioritized before the non-critical buildings. Additional demand/response protocols are anticipated to be explored within the feasibility study

The sequence of operation for the microgrid will be as described below.

Stage One - Identification of grid failure and isolation from failed grid

Upon an outage to MGE feeder Pheasant Branch 1321 and after determining that the outage cause is not within the area served by the Middleton Microgrid, the Middleton Microgrid separates from the utility grid and re-establishes electrical service to the customers located within the microgrid. Upon establishment of the Middleton Microgrid, controllers begin autonomous control of stored energy resources, variable renewable generation resources, and demand response resources. The controllers will balance generation and load and maintain proper power quality until the stored energy resources and variable renewable generation resources are depleted (minimum of 4 hours, maximum only limited by renewable resource availability).

Stage Two – Island mode with no load or facility shedding

If the storage and variable renewable resources become unable to maintain the power requirements of the microgrid (for example at night and after an extended outage), existing traditional backup generation will be activated to ensure the integrity of the microgrid. The traditional backup generation will provide the minimal energy necessary to maintain the microgrid until such time that the variable renewable resources are completely able to supply the energy needs of the microgrid. The modular design of the system will allow additional renewable resources and storage to be added into the microgrid at any time reducing reliance on any traditional generation resources.

Stage Three – Island mode failure with transition to local building emergency power

If the storage and variable renewable resources become unable to maintain the power requirements of the microgrid (for example at night and after an extended outage), critical resources within the community will separate from the microgrid and continue to operate using traditional energy resources, local renewable resources and local storage. The traditional backup generation will provide the minimal energy necessary to maintain the critical facilities until such time that the variable renewable resources are completely able to supply the energy needs of the critical load. The modular design of the system will allow additional renewable resources to be added to the critical load at any time reducing reliance on any traditional generation resources.

3.4.9. Financial Analysis

Due to the ambitious scope of this project, a simple single customer/single owner type model financial analysis is not possible to complete. Prior to any financial analysis, the project team will work together to identify component ownership and potential tariff structures that can be utilized for this type of microgrid. A significant part of this analysis will be developing innovative ownership and payment models

that can be used to support the microgrid. The following questions would need to be answered prior to any financial analysis:

- 1) What equipment is owned by MGE and what equipment can be customer owned?
- 2) How do customers served by the microgrid pay for the service?
- 3) How are cross subsidization issues addressed?
- 4) How can the MGE owned microgrid resources be leveraged for additional value generation, such as demand response or other grid services that benefit all ratepayers served by MGE?
- 5) How can customers be compensated for hosting utility owned-customer sited solar PV installations?
- 6) Is it possible for existing customer generation to interact with multiple generation sources in the islanded microgrid configuration? If not, what are the costs to modify equipment to operate in a microgrid environment?

Once the ownership and tariff structures are developed, the financial analysis can be performed from the customer perspective. The study will look at a sample of facilities, such as those with no on-site generators, those with solar PV only, those with storage only and those with a combination of generation and storage. MGE will provide costs for their required microgrid equipment and develop potential ideas for incorporating these costs into customer tariffs.

In addition to the financial analysis, alternative project financing options will be evaluated including:

- **State or Federal Grants** The City of Middleton is highly experienced in tracking state and federal funding priorities, applying for and administering grant funds and would look to any potential state or federal grant funds to aid in completion of the BP Microgrid project.
- **TID Funds** The BP Microgrid study area is located in Tax Increment District #3. There is potential to fund design and infrastructure work with TID funds.
- **Battery Cost Sharing** The City of Middleton could work with MGE on a cost sharing scenario on the project's battery storage. A potential scenario could include MGE ownership of the system while the City of Middleton pays for battery backup service.
- **Middleton Area Development Corporation** A Middleton-focused loan program to support local businesses and develop economic opportunity. The BP microgrid concept is ideally suited for the fund, as each business can obtain favorable loan packages to support individual solar installation.
- **Tax Credit Monetization** The City of Middleton has experience working with state and federal tax credit programs to accomplish renewable energy projects and would explore all possible opportunities to monetize tax credits to finance this project, including opportunities for customer sited solar PV installations to recoup 26% of system install costs as a federal tax credit.

The BP Microgrid seeks to not only serve critical logistic and public health infrastructure but will enable critical economic contributors to remain operational even in times of distress. Keeping businesses open and operational stabilizes the Middleton and greater Dane County economy. Unlike in the flooding of 2018, businesses and employers will be able to stay open or at least maintain functioning heating,

cooling, refrigeration, and other essential functions to prevent major inventory and resource losses. This will help the economy better respond to and recover from potential shocks.

3.4.10. Environmental Impact

Through the feasibility study, the consultant will estimate the total environmental impact resulting from the implementation of the microgrid. The most significant emissions reduction strategy will be from the solar PV panels which would replace existing grid power. At this time, the total solar PV capacity is not known so an estimated emission reduction cannot be determined. Other microgrid technology such as batteries also have the potential to reduce GHG emissions from existing fossil-based resources depending on the dispatch method. Traditional generation included in the project concept will be used in rare situations, only to keep the most critical infrastructure in the BP Microgrid powered, and therefore present a minimal environmental impact.

3.5 Reference Materials

1. Study Area Map
2. Business Park Solar Sites List
3. City of Middleton Resolution
4. Letters of Support
 - 4.1. MG&E
 - 4.2. KEVA Sports Center
 - 4.3. Additional Business Park Businesses
5. [Sustainable City Plan](#) (Linked in Document)
6. [2021 Comprehensive Plan Update](#) (Linked in Document)

City of Middleton Emergency Resilience Microgrid Program

- Opportunities for Rooftop Solar
- Critical Operations

Feasibility
Study Area

Existing
Solar

Community
Resilience
Center Location

Airport

AIRPORT RD

Existing
Solar
HyCite

Keva

Electric
Theatre
Controls

UW Health
Pharmacy

Miramount
Behavioral
Health

DEMING WAY

Spectrum

HIGHWAY 12

UW Health
Administrative
Offices

Existing
Solar

UW Provision

UPS

UNIVERSITY AVE

Downtown Middleton

Business Name	Address	Solar Opportunity	Existing Solar
1 360 Athletics	8155 Forsythia St	X	
2 A2 Security Systems	3308 Nursery Dr		
3 ACD Distribution	3129 Deming Way	X	
4 Alan Boehmer Design	8120 Forsythia St		
5 American Girl	8400 Fairway Pl	X	
6 Automation Components Inc	2305 Pleasant View Rd		
7 Beacon Athletics	8233 Forsythia St	X	
8 Big Block Midwest	3304 Nursery Dr		
9 Bob Suter's Capitol Ice Arena	2616 Pleasant View Rd		
10 Boley Tree & Landscape Care Inc	2305 Parview Rd		
11 Burn Boot Camp	8233 Forsythia St	X	
12 Caliber Collision	8026 Forsythia St		
13 Clubhouse for Kids II	3150 Deming Way		
14 Costco	2150 Deming Way	X	
15 Costco Gasoline	2400 Deming Way		
16 Distinctive Road Creations	7919 Airport Rd		
17 Dybdahl Design Group	8120 Forsythia St		
18 Economy Transmission	7912 Forsythia Ct		
19 Electronic Theatre Controls	3031 Pleasant View Rd	X	
20 ePac Flexible Packaging	8233 Forsythia St	X	
21 Fickett Structural Solutions	3148 Deming Way		
22 Fiskars Brands Inc	7800 Discovery Dr		
23 Fix'm Home Repairs	7919 Airport Rd		
24 Genetic Visions	8137 Forsythia St	X	
25 Gilmour Garden & Watering	7800 Discovery Dr		
26 Gold Medal Performance	2616 Pleasant View Rd		
27 Gretchen Collins, MD	3146 Deming Way		
28 Hall Lumber Sales Inc	2314 Parview Rd		
29 Happy Dogz	3148 Deming Way		
30 Hart DeNoble Builders	7923 Airport Rd		
31 Hitters SportsPlex	3170 Deming Way	X	
32 Hy Cite Enterprises	3252 Pleasant View Rd		X
33 Infinity Martial Arts	8233 Forsythia St	X	

34 Kehl School of Dance	8152 Forsythia St		
35 Keva Sports Center	8312 Forsythia St	X	
36 Knight Hollow Nursery	7911 Forsythia Ct		
37 Loren Imhoff Homebuilder	7919 Airport Rd		
38 Madison Pavement Maintenance	8123 Forsythia St	X	
39 Middleton -Cross Plains Area School District Transportation Center	3180 Deming Way	x	
40 Middleton Gymnastics Academy	8152 Forsythia St		
41 Miramont Behavioral Health	3169 Deming Way	X	
42 Morey Airplane Company	8300 Airport Road		X
43 Name Badge Productions	3220 Deming Way		
44 Network Engineering Technologies	3140 Deming Way		
45 Paramount Residential Mortgage Group	3308 Nursery Dr		
46 PPD Inc	3230 Deming Way	X	
47 Primrose School of Middleton	3000 Deming Way		
48 Rainbow Group LLC	8233 Forsythia St	X	
49 Rockwell Automation	8155 Forsythia St	X	
50 RTI Donor Services	8120 Forsythia St		
51 Silver Lining Taekwon-do	3170 Deming Way		
52 Specialty Insurance Solutions	3220 Deming Way		
53 Spectrum Brands Corporate Campus	3001 Deming Way	X	
54 The Mattel Toy Store	8400 Fairway Pl	X	
55 TNT Window Tinting	7927 Airport Rd		
56 TownePlace Suites by Marriot Madison West/Middleton	3055 Deming Way		
57 UPS Customer Center	8350 Murphy Dr	X	
58 USA Mortgage	3308 Nursery Dr		
59 UW Health Administrative Office Building	3185 Deming Way	X	
60 UW Health Pharmacy Services	7974 UW Health Ct	X	
61 UW Provision Company	2315 Pleasant View Rd		X
62 Varigen BioSciences Corporation	3220 Deming Way		
63 Wisconsin Fertility Institute	3146 Deming Way		

**Supporting a Public Service Commission of Wisconsin Office of Energy Innovation Grant
Application to Explore the Feasibility of a Renewable Electricity Microgrid to Serve
Buildings in Middleton**

WHEREAS, In August 2018, almost a foot of rain fell on Middleton in 24 hours, causing massive flooding – including of the industrial district – leading to a Federal Disaster Declaration. Many businesses were without power and experienced extensive flooding and cessation of business; and

WHEREAS, The 2018 flood event led to a realization that the city’s emergency infrastructure was based on pre-climate change calculations, and that an entirely new level of preparedness would be required going forward; and

WHEREAS, Middleton has a well-defined light industrial district with a number of large warehouses and offices. These businesses and organizations comprise a significant percentage of the essential service infrastructure for western Dane County, as well as providing extensive space for emergency lodging; and


WHEREAS, By building a microgrid in this area powered primarily through renewable resources, Middleton will be able to prepare for ongoing energy needs during a general power shutdown, emergency housing for residents, and securing the food distribution infrastructure for the area; and

WHEREAS, A microgrid powered through renewable resources would be an important step towards achieving the City’s goals for meeting 25 percent of its electric needs for City operations through renewable energy resources by 2025, 80 percent by 2030, and 100 percent by 2035; and

WHEREAS, Madison Gas and Electric supports this effort in order to create resiliency and sustainability in our light industrial district; and

NOW, THEREFORE, BE IT RESOLVED BY THE MIDDLETON MAYOR and COMMON COUNCIL, that the Mayor and members of the Council support the preparation and filing of an application for a Public Service Commission of Wisconsin Office of Energy Innovation grant to explore the feasibility of a renewable electricity microgrid to serve critical infrastructure in Middleton.

City of Middleton, Mayor


Gurdip Brar

ATTEST:


Lorie J. Burns, City Clerk

AYES: 8

NOES: 0

ADOPTED: 8/3/2021



Madison Gas and Electric Company

P.O. Box 1231

Madison, WI 53701-1231

608-252-7000

your community energy company

August 4, 2021

Sent Via Email

jmaloney@vandewalle.com

aattoun@cityofmiddleton.us

Mr. Jeff Maloney
Vandewalle and Associates
120 East Lakeside Street
Madison WI 53715

Ms. Abby Attoun
City of Middleton
7426 Hubbard Avenue
Middleton WI 53562

Dear Sir and Madam:

Madison Gas and Electric Company (MGE) is pleased to provide this letter to support the City of Middleton microgrid study.

The project application will support a stakeholder engaged process for evaluating and conducting a microgrid feasibility study. The team will study and identify potential deployment strategies for solar photovoltaics (PV), energy storage, and other microgrid technologies to bolster resilience of a portion of the distribution system identified in the City of Middleton against power outages. The study will also model and analyze load profiles, microgrid designs, and project costs/benefits.

MGE understands the value of this project and looks forward to contributing as a strategic and technical partner of the applicant. Please contact me with questions or concerns at (715) 323-1686 or alindgren@mge.com.

Sincerely,

Aaron Lindgren

Aaron Lindgren
Engineer IV Energy Products and Services

dsh

August 4, 2021

Greetings,

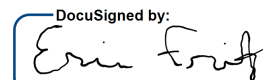
I am the owner of KEVA Sports Center, and I am writing to express my strong support for awarding an Energy Innovation Grant to explore the feasibility of a renewable electricity microgrid to serve critical infrastructure in Middleton.

It is never too early to prepare for a disaster. Middleton is all too aware of the need to prepare for the unexpected after nearly a foot of rain fell in 24 hours in 2018, causing massive flooding and leading to a Federal Disaster Declaration. My business experienced some water damage from the flood, and many other businesses in the Airport Road Business Park area experienced major flooding and power outages. I think it is a great idea to explore the option of installing a renewable energy microgrid in a critical area of our city.

My business is located near an exit from the beltline highway, an airport, and is minutes away from Police, Fire, and EMS. In the event of a major disaster, our facility could serve as a community resource. It would give me peace of mind to know that there is an emergency energy backup available to allow my facility to serve our community during a disaster.

I am excited for the potential for this project. I stand in strong support for awarding an Energy Innovation Grant to the City of Middleton.

Sincerely,

DocuSigned by:

03127A8B3844404...

Eric Fritz

Owner

KEVA Sports Center

August 5, 2021

Public Service Commission of Wisconsin
Office of Energy Innovation
4822 Madison Yards Way
Madison, WI 53705

Dear PSC Staff and Commissioners,

UW Health is pleased to share this letter of support for the Middleton community microgrid study at the Middleton industrial park. UW Health currently has two facilities in the project area including the Administrative Office Building and the Pharmacy Services Building, a mission critical pharmacy compounding and distribution facility serving our area hospitals and clinics.

As part of this study, the City of Middleton, MGE and their consultants will evaluate how a community or Town Center (TC) Microgrid could be developed in the project area to provide for a more resilient and renewable power system using solar PV, battery storage and innovative microgrid control strategies. UW Health is excited to be part of such an ambitious effort to explore the feasibility of the proposed microgrid. As an active member of Practice Greenhealth, we are continually focused on improving our sustainability and this project provides an opportunity to apply these efforts on a community level.

Additionally, one of the proposed consultants, HGA Architects and Engineers, has worked on both facilities and is familiar with our building systems and operation which will be useful when evaluating how these buildings would potentially tie in and operate in the microgrid configuration.

We look forward to participating in this project and hope that a grant is awarded to explore this unique and ambitious opportunity.

Sincerely,

Mary Statz, MS
UW Health
Program Director Energy Management & Sustainability

Cc: Abby Attoun, Director of Planning and Community Development



August 4, 2021

Wisconsin Public Service Commission
Office of Energy Innovation

Greetings,

I am writing to express my strong support for awarding an Energy Innovation Grant to explore the feasibility of a renewable electricity microgrid to serve critical infrastructure in Middleton.

Spectrum Brands is one of the largest employers in Middleton, and our headquarters is located immediately adjacent to the location of this proposed project. We built, and expanded, our building to the point it now holds almost 4000 employees with extensive telecommunication infrastructure. We also have a strong sustainability mission with our company, and are constantly looking for innovative ways to improve our environment.

In 2018, Middleton suffered catastrophic flooding and was declared a Federal Disaster. Our building was surrounded by floodwaters, and we were stunned by the power of a single (albeit large) storm that was able to overwhelm the existing systems in the area. Since then, we have redoubled our efforts to secure our building from damage, to improve our ability to respond to crises, and to integrate more fully with our surrounding community. We purchased a very large diesel generator to provide power to our building in the event of another power outage – although we hope we do not have to use it.

This idea of a microgrid supporting the businesses in this park is one we fully support. We have the airport a few blocks away, are immediately adjacent to two on-ramps to the interstate highway, and are close to a child care center, medical centers, and distribution warehouses. While our immediate focus in any project will be to ensure the continuity of our power to protect our international business operations, we will also be interesting in how we can help the greater community in the event of a longer-term crisis situation.

I am excited for the potential for this project. I stand in strong support for awarding an Energy Innovation Grant to the City of Middleton.

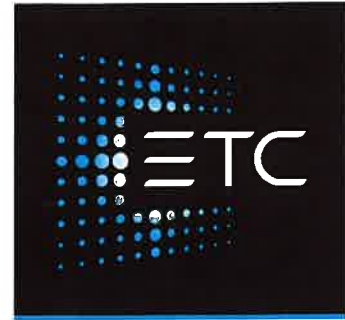
Sincerely,

David D Hanson AIA, LEED AP
Facilities Leader
Spectrum Brands
3001 Deming Way
Middleton, WI 53562

David.Hanson@Spectrumbrands.com

Phone: (608) 278-6469

Spectrum
Brands



August 4, 2021

Greetings,

I am the President/CEO of Electronic Theatre Controls, Inc. ("ETC"), and I am writing to express ETC's support for awarding an Energy Innovation Grant to explore the feasibility of a renewable electricity microgrid to serve critical infrastructure in Middleton.

It is never too early to prepare for a disaster. Middleton is all too aware of the need to prepare for the unexpected after nearly a foot of rain fell in 24 hours in 2018, causing massive flooding and leading to a Federal Disaster Declaration. Many businesses in the Airport Road Business Park area experienced major flooding and power outages. I think it is a great idea to explore the option of installing a renewable energy microgrid in a critical area of our city.

It is exciting that we may be able to expand the renewable energy in the Airport Road Business Park. The business park has a lot of critical infrastructure that will play a key role in any disaster response. This is an excellent opportunity to ensure that local businesses can transition to renewable energy while increasing our resilience in the face of a natural disaster.

We are excited for the potential for this project. ETC supports awarding an Energy Innovation Grant to the City of Middleton.

Sincerely,

Richard L. Titus

President/CEO

Electronic Theatre Controls, Inc.

August 4, 2021

Greetings,

I am the manager of the Middleton Municipal Airport, and I am writing to express my strong support for awarding an Energy Innovation Grant to explore the feasibility of a renewable electricity microgrid to serve critical infrastructure in Middleton.

It is never too early to prepare for a disaster. Middleton is all too aware of the need to prepare for the unexpected after nearly a foot of rain fell in 24 hours in 2018, causing massive flooding and leading to a Federal Disaster Declaration. I think it is a great idea to explore the option of installing a renewable energy microgrid in a critical area of our city.

In the event of a major disaster, the airport would likely play a critical role in the disaster response. UW MedFlight uses the airport as a reliever airport and organ/tissue transplant flights by RTI Donor are flown from the airport. Our proximity to the business park, the beltline highway, Police, Fire, and EMS means we are well situated to move people and supplies in and out of the area. It would give me peace of mind to know that there is an emergency energy backup available to allow my facility to serve our community during a disaster.

I am excited for the potential for this project. I stand in strong support for awarding an Energy Innovation Grant to the City of Middleton.

Sincerely,



Rich Morey
Airport Manager
Middleton Municipal Airport